

SINGLE CORRECT TYPE

1. Let x_1 and x_2 be the roots of the quadratic equation $x^2 + px + q = 0$.
If $x_1 = \frac{x_2 + 4}{2x_2 - 1}$, then the value of $(2q + p)$ is equal to
(A) 1 (B) 2 (C) 3 (D) 4
2. The value of the expression $x^4 - 8x^3 + 18x^2 - 8x + 2$ when $x = \cot \frac{\pi}{12}$, is
(A) 2 (B) 1 (C) 0 (D) 3
3. If $P(x) = ax^2 + bx + c$ and $Q(x) = -ax^2 + dx + c$, where $ac \neq 0$, then $P(x) \cdot Q(x) = 0$ has
(A) exactly one real root (B) at least two real roots
(C) exactly three real roots (D) all four are real roots.
4. If α, β are the roots of the equation $x^2 + px - r = 0$ and $\alpha/3, 3\beta$ are the roots of the equation $x^2 + qx - r = 0$, then r equals
(A) $\frac{3}{8}(p - 3q)(3p + q)$ (B) $\frac{3}{8}(p + 3q)(3p - q)$
(C) $\frac{3}{64}(3p - q)(p - 3q)$ (D) $\frac{3}{64}(3p - q)(p - q)$
5. Let λ_1 and λ_2 be two values of λ for which the expression $x^2 + (2 - \lambda)x + \lambda - \frac{3}{4}$ becomes a perfect square. The value of $(\lambda_1^2 + \lambda_2^2)$ equals
(A) 8 (B) 25 (C) 50 (D) 100
6. If e^λ and $e^{-\lambda}$ are the roots of equation $3x^2 - (a + b)x + 2a = 0$, $a, b, \lambda \in \mathbb{R}, \lambda \neq 0$ then least integral value of b is
(A) 4 (B) 5 (C) 9 (D) 10
7. If α, β are the roots of the quadratic equation $x^2 + 2(1 - \cos 3\theta)x - 2 \sin^2 3\theta = 0$ ($\theta \in \mathbb{R}$), then the maximum value of $\alpha^2 + \beta^2$ is equal to
(A) 0 (B) 4 (C) 8 (D) 16

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8. If $(a + b + c) > 0$ and $a < 0 < b < c$, then the equation $a(x - b)(x - c) + b(x - c)(x - a) + c(x - a)(x - b) = 0$ has

(MATHEMATICS)

Quadratic Equation

- (A) real and distinct roots (B) roots are imaginary
 (C) product of roots is negative (D) product of roots is positive
9. If one of the root of the equation $4x^2 - 15x + 4p = 0$ is the square of the other then the value of p is
 (A) $125/64$ (B) $-27/8$ (C) $-125/8$ (D) $27/8$

MATCH THE COLUMN

10. Consider the quadratic equation $(k^2 - 1)x^2 + (2k^3 + 9k^2 + 3k - 14)x + (2k^3 + 5k^2 - 11k - 14) = 0$ then find the the sum of all the value(s) of k (where $k \in \mathbb{R}$) for which the given equation has

Column-I

- (A) Exactly one root zero and other root is finite
 (B) Both roots zero
 (C) Exactly one root infinity
 (D) Both roots infinity

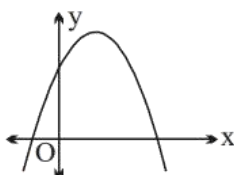
Column-II

- (P) -1
 (Q) $\frac{-5}{2}$
 (R) 2
 (S) $\frac{-7}{2}$
 (T) 1

DPP - 2

SINGLE CORRECT TYPE

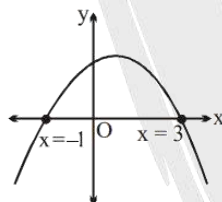
1. The graph of a quadratic polynomial $y = px^2 - qx + r$ is as shown in the adjacent figure, then



- (A) $r^2 - 4q < 0$ (B) $r^2 - 4p < 0$ (C) $p + q > 0$ (D) $r - p - q > 0$
2. If the graph of $f(x) = x^2 + (3 - k)x + k$ (where $k \in \mathbb{R}$) lies above and below x -axis, then k cannot be
(A) -1 (B) 0 (C) 1 (D) 10.
3. The smallest integral value of p for which the inequality $(p - 3)x^2 - 2px + 3(p - 2) > 0$ is satisfied for all real values of x , is .
(A) 8 (B) 7 (C) 6 (D) 5
4. The largest integral value of k for which the quadratic trinomial $P(x) = (k - 2)x^2 + 8x + k + 4$ is non-positive for all real values of x is
(A) 2 (B) 4 (C) -6 (D) -2

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5. Consider the graph of quadratic polynomial $y = ax^2 + bx + c$ as shown below. Which of the following is(are) correct ?



- (A) $\frac{a - b + c}{abc} = 0$ (B) $abc(9a + 3b + c) < 0$
- (C) $\frac{a + 3b + 9c}{abc} < 0$ (D) $ab(a - 3b + 9c) > 0$
6. If S is the set of all real ' x ' such that $\frac{x^2(5-x)(1-2x)}{(5x+1)(x+2)}$ is negative and $\frac{3x+1}{6x^3+x^2-x}$ is positive, then S contains
(A) (1, 4) (B) (5, 11) (C) $\left(-\frac{3}{2}, \frac{-1}{2}\right)$ (D) (-10, -4)

INTEGER TYPE

7. Let $f(x) = x^2 + px - 2$, $g(x) = px^2 + x + (p + 2) \forall x \in \mathbb{R}$, where p is a real constant.

If $f(x) > g(x) \forall x \in \mathbb{R}$, then the range of p is $\left(-\infty, \frac{m}{n}\right)$ where m and n are coprime.

Find the value of $(m - 5n)$.

8. Let $x^2 + 2y^2 - 2xy - 2 \geq k(x + 2y) \forall x, y \in \mathbb{R}$, then find the number of integral values of k .

(A) 3 (B) 2 (C) 4 (D) 0

9. If the roots of the equation

$X^2 + (p + 1)x + 2q - q^2 + 3 = 0$ are real and unequal $\forall x, p \in \mathbb{R}$ then find the minimum integral value of $(q^2 - 2q)$

(A) 3 (B) 2 (C) 4 (D) 0



DPP - 3

SINGLE CORRECT TYP

- If $c^2 = 4d$ and the two equations $x^2 - ax + b = 0$ and $x^2 - cx + d = 0$ have one common root, then the value of $2(b + d)$ is equal to
 (A) $\frac{a}{c}$ (B) ac (C) $2ac$ (D) $a + c$
- If one root of quadratic equation $x^2 - x + 3m = 0$ is 4 times the root of the equation $x^2 - x + m = 0$, where $m \neq 0$, then m equals
 (A) $\frac{12}{196}$ (B) $\frac{12}{169}$ (C) $\frac{12}{256}$ (D) $\frac{12}{189}$
- Statement-1 :** If the equations $ax^2 + bx + c = 0$ ($a, b, c \in \mathbb{R}$ and $a \neq 0$) and $2x^2 + 7x + 10 = 0$ have a common root,
 Then $\frac{2a + c}{b} = 2$
Statement-2 : If both roots of $a_1 x^2 + b_1 x + c_1 = 0$ and $a_2 x^2 + b_2 x + c_2 = 0$ are same, then $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.
 Given $a_1, b_1, c_1, a_2, b_2, c_2 \in \mathbb{R}$
 (A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
 (B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
 (C) Statement-1 is true, statement-2 is false.
 (D) Statement-1 is false, statement-2 is true.
- A monic quadratic polynomial $P(x)$ is such that $P(x) = 0$ and $P(P(P(x))) = 0$ have common root, then
 (A) $P(0) \cdot P(1) > 0$ (B) $P(0) \cdot P(1) < 0$ (C) $P(0) \cdot P(1) = 0$ (D) None
- If the equations $x^3 + x^2 - 4x = 4$ and $x^2 + px + 2p = 0$ ($p \in \mathbb{R}$) have two roots common, then the value of p is
 (A) -2 (B) -1 (C) 1 (D) 3

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- If all the equations $x^2 + px + 10 = 0$, $x^2 + qx + 8 = 0$ and $x^2 + (2p + 3q)x + 60 = 0$, where $p, q \in \mathbb{R}$ have a common root, then the value of $(p - q)$ can be
 (A) -1 (B) 0 (C) 1 (D) 2
- If quadratic equations $2x^2 - 3x + 5 = 0$ and $ax^2 - bx + c = 0$, $a, b, c \in \mathbb{N}$ have a common root then the value of $a + b + c$ can be equal to

(MATHEMATICS)

Quadratic Equation

(A) 10

(B) 15

(C) 20

(D) 25

8. The equations $x^3 + 4x^2 + px + q = 0$ and $x^3 + 6x^2 + px + r = 0$ have two common roots, where $p, q, r \in \mathbb{R}$. If their uncommon roots are the roots of equation $x^2 + 2ax + 8c = 0$, then (A) $a + c = 8$ (B) $a + c = 2$ (C) $3q = 2r$ (D) $3r = 2q$

(A) $a + c = 8$

(B) $a + c = 2$

(C) $3q = 2r$

(D) $3r = 2q$

INTEGER TYPE

9. If $x^2 + 3x + 5$ is the greatest common divisor of $(x^3 + ax^2 + bx + 1)$ and $(2x^3 + 7x^2 + 13x + 5)$ then find the value of $[a + b]$.

[Note : $[k]$ denotes greatest integer less than or equal to k .]



ANSWER KEY

DPP - 1

1. D 2. B 3. B 4. C 5. C 6. B 7. D
8. A, C 9. C, D 10. $A \rightarrow R, B \rightarrow S, C \rightarrow P, D \rightarrow T$

DPP - 2

1. D 2. C 3. B 4. C 5. A, C 6. A, C 7. 2
8. 0 9. 4

DPP - 3

1. B 2. B 3. A 4. C 5. B 6. A, C 7. A, C
8. A, C 9. 8

